

SEQUENCE LISTING



<110> TABOLINA, EKATERINA

RYBAK, KONSTANTIN

KHOURGES, EVGENI

VOROSHILOVA, ELVIRA

GUSYATINER, MIKHAIL

<120> METHOD FOR PRODUCING L-AMINO ACID USING BACTERIA BELONGING TO THE GENUS  
ESCHERICHIA

<130> 219594US0

<140> 10/073,293

<141> 2002-02-13

<150> RU 2001103865

<151> 2001-02-13

<150> RU 2001104998

<151> 2001-02-26

<150> RU 2001104999

<151> 2001-02-26

<150> RU 2001117632

<151> 2001-06-28

<150> RU 2001117633

<151> 2001-06-28

<160> 16

<170> PatentIn version 3.1

<210> 1

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

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<400> 1

ggctctagaca atcgttaagc gtacac

26

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<211> 738

<212> DNA

<213> Escherichia coli

<220>

<221> CDS

<222> (1)..(735)

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Met Glu Ser Pro Thr Pro Gln Pro Ala Pro Gly Ser Ala Thr Phe Met	
1 5 10 15	

gaa gga tgc aaa gac agt tta ccg att gtt att agt tat att ccg gtg	96
Glu Gly Cys Lys Asp Ser Leu Pro Ile Val Ile Ser Tyr Ile Pro Val	
20 25 30	

gcc ttt gcg ttc ggt ctg aat gcg acc cgt ctg gga ttc tct cct ctc	144
Ala Phe Ala Phe Gly Leu Asn Ala Thr Arg Leu Gly Phe Ser Pro Leu	
35 40 45	

gaa agc gtt ttt ttc tcc tgc atc att tat gca ggc gcg agc cag ttc	192
Glu Ser Val Phe Phe Ser Cys Ile Ile Tyr Ala Gly Ala Ser Gln Phe	
50 55 60	

gtc att acc gcg atg ctg gca gcc ggg agt agt ttg tgg att gct gca	240
Val Ile Thr Ala Met Leu Ala Ala Gly Ser Ser Leu Trp Ile Ala Ala	
65 70 75 80	

ctg acc gtc atg gca atg gat gtt cgc cat gtg ttg tat ggc ccg tca	288
Leu Thr Val Met Ala Met Asp Val Arg His Val Leu Tyr Gly Pro Ser	
85 90 95	

ctg cgt agc cgt att att cag cgt ctg caa aaa tcg aaa acc gcc ctg	336
Leu Arg Ser Arg Ile Ile Gln Arg Leu Gln Lys Ser Lys Thr Ala Leu	
100 105 110	
tgg gcg ttt ggc ctg acg gat gag gtt ttt gcc gcc gca acc gca aaa	384
Trp Ala Phe Gly Leu Thr Asp Glu Val Phe Ala Ala Ala Thr Ala Lys	
115 120 125	
ctg gta cgc aat aat cgc cgc tgg agc gag aac tgg atg atc ggc att	432
Leu Val Arg Asn Asn Arg Arg Trp Ser Glu Asn Trp Met Ile Gly Ile	
130 135 140	
gcc ttc agt tca tgg tca tcg tgg gta ttt ggt acg gta ata ggg gca	480
Ala Phe Ser Ser Trp Ser Ser Trp Val Phe Gly Thr Val Ile Gly Ala	
145 150 155 160	
ttc tcc ggc agc ggc ttg ctg caa ggt tat ccc gcc gtt gaa gct gca	528
Phe Ser Gly Ser Gly Leu Leu Gln Gly Tyr Pro Ala Val Glu Ala Ala	
165 170 175	
tta ggt ttt atg ctt ccg gca ctc ttt atg agt ttc ctg ctc gcc tct	576
Leu Gly Phe Met Leu Pro Ala Leu Phe Met Ser Phe Leu Leu Ala Ser	
180 185 190	
ttc cag cgc aaa caa tct ctt tgc gtt acc gca gcg tta gtt ggt gcc	624
Phe Gln Arg Lys Gln Ser Leu Cys Val Thr Ala Ala Leu Val Gly Ala	
195 200 205	
ctt gca ggc gta acg cta ttt tct att ccc gtc gcc att ctg gca ggc	672
Leu Ala Gly Val Thr Leu Phe Ser Ile Pro Val Ala Ile Leu Ala Gly	
210 215 220	
att gtc tgt ggc tgc ctc act gcg tta atc cag gca ttc tgg caa gga	720
Ile Val Cys Gly Cys Leu Thr Ala Leu Ile Gln Ala Phe Trp Gln Gly	
225 230 235 240	
gcg ccc gat gag cta tga	738
Ala Pro Asp Glu Leu	
245	

<210> 4

<211> 245

<212> PRT

<213> Escherichia coli

<400> 4

Met Glu Ser Pro Thr Pro Gln Pro Ala Pro Gly Ser Ala Thr Phe Met  
1 5 10 15

Glu Gly Cys Lys Asp Ser Leu Pro Ile Val Ile Ser Tyr Ile Pro Val  
20 25 30

Ala Phe Ala Phe Gly Leu Asn Ala Thr Arg Leu Gly Phe Ser Pro Leu  
35 40 45

Glu Ser Val Phe Phe Ser Cys Ile Ile Tyr Ala Gly Ala Ser Gln Phe  
50 55 60

Val Ile Thr Ala Met Leu Ala Ala Gly Ser Ser Leu Trp Ile Ala Ala  
65 70 75 80

Leu Thr Val Met Ala Met Asp Val Arg His Val Leu Tyr Gly Pro Ser  
85 90 95

Leu Arg Ser Arg Ile Ile Gln Arg Leu Gln Lys Ser Lys Thr Ala Leu  
100 105 110

Trp Ala Phe Gly Leu Thr Asp Glu Val Phe Ala Ala Ala Thr Ala Lys  
115 120 125

Leu Val Arg Asn Asn Arg Arg Trp Ser Glu Asn Trp Met Ile Gly Ile  
130 135 140

Ala Phe Ser Ser Trp Ser Ser Trp Val Phe Gly Thr Val Ile Gly Ala  
145 150 155 160

Phe Ser Gly Ser Gly Leu Leu Gln Gly Tyr Pro Ala Val Glu Ala Ala  
165 170 175

Leu Gly Phe Met Leu Pro Ala Leu Phe Met Ser Phe Leu Leu Ala Ser  
180 185 190

Phe Gln Arg Lys Gln Ser Leu Cys Val Thr Ala Ala Leu Val Gly Ala  
 195 200 205

Leu Ala Gly Val Thr Leu Phe Ser Ile Pro Val Ala Ile Leu Ala Gly  
 210 215 220

Ile Val Cys Gly Cys Leu Thr Ala Leu Ile Gln Ala Phe Trp Gln Gly  
 225 230 235 240

Ala Pro Asp Glu Leu  
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<210> 5

<211> 336

<212> DNA

<213> Escherichia coli

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<221> CDS

<222> (1)..(333)

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Met	Ser	Tyr	Glu	Val	Leu	Leu	Leu	Gly	Leu	Leu	Val	Gly	Val	Ala	Asn	
1				5				10					15			

tat	tgc	ttc	cgc	tat	ttg	ccg	ctg	cgc	ctg	cgt	gtg	ggt	aat	gcc	cgc	96
Tyr	Cys	Phe	Arg	Tyr	Leu	Pro	Leu	Arg	Leu	Arg	Val	Gly	Asn	Ala	Arg	
			20					25					30			

cca	acc	aaa	cgt	ggc	gcg	gta	ggt	att	ttg	ctc	gac	acc	att	ggc	atc	144
Pro	Thr	Lys	Arg	Gly	Ala	Val	Gly	Ile	Leu	Leu	Asp	Thr	Ile	Gly	Ile	
		35					40					45				

gcc	tcg	ata	tgc	gct	ctg	ctg	gtt	gtc	tct	acc	gca	cca	gaa	gtg	atg	192
Ala	Ser	Ile	Cys	Ala	Leu	Leu	Val	Val	Ser	Thr	Ala	Pro	Glu	Val	Met	
50					55						60					

cac	gat	aca	cgc	cgt	ttc	gtg	ccc	acg	ctg	gtc	ggc	ttc	gcg	gta	ctg	240
His	Asp	Thr	Arg	Arg	Phe	Val	Pro	Thr	Leu	Val	Gly	Phe	Ala	Val	Leu	
65					70					75					80	

ggg	gcc	agt	ttc	tat	aaa	aca	cgc	agc	att	atc	atc	cca	aca	ctg	ctt	288
Gly	Ala	Ser	Phe	Tyr	Lys	Thr	Arg	Ser	Ile	Ile	Ile	Pro	Thr	Leu	Leu	
				85					90					95		

agt	gcg	ctg	gcc	tat	ggg	ctc	gcc	tgg	aaa	gtg	atg	gcg	att	ata	taa	336
Ser	Ala	Leu	Ala	Tyr	Gly	Leu	Ala	Trp	Lys	Val	Met	Ala	Ile	Ile		
			100					105					110			

<210> 6

<211> 111

<212> PRT

<213> Escherichia coli

<400> 6

Met	Ser	Tyr	Glu	Val	Leu	Leu	Leu	Gly	Leu	Leu	Val	Gly	Val	Ala	Asn
1				5					10					15	

Tyr	Cys	Phe	Arg	Tyr	Leu	Pro	Leu	Arg	Leu	Arg	Val	Gly	Asn	Ala	Arg
			20					25					30		

Pro	Thr	Lys	Arg	Gly	Ala	Val	Gly	Ile	Leu	Leu	Asp	Thr	Ile	Gly	Ile
		35					40					45			

Ala	Ser	Ile	Cys	Ala	Leu	Leu	Val	Val	Ser	Thr	Ala	Pro	Glu	Val	Met
	50					55					60				

His	Asp	Thr	Arg	Arg	Phe	Val	Pro	Thr	Leu	Val	Gly	Phe	Ala	Val	Leu
65					70					75					80

Gly Ala Ser Phe Tyr Lys Thr Arg Ser Ile Ile Ile Pro Thr Leu Leu  
85 90 95

Ser Ala Leu Ala Tyr Gly Leu Ala Trp Lys Val Met Ala Ile Ile  
100 105 110

<210> 7

<211> 37

<212> DNA

<213> Artificial Sequence

<220>

<223> Synthetic DNA

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<211> 34

<212> DNA

<213> Artificial Sequence

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<223> Synthetic DNA

<400> 8

ctgtttctag atcctgtgtg aaattgttat ccgc

34

<210> 9

<211> 28

<212> DNA



<213> Artificial Sequence

<220>

<223> Synthetic DNA

<400> 9

ggtctagata tggctaacat tatccggc

28

<210> 10

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Synthetic DNA

<400> 10

ccggatccaa acggagcatg gcagctcc

28

<210> 11

<211> 648

<212> DNA

<213> Escherichia coli

<220>

<221> CDS

<222> (1) .. (645)

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<400> 11

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1 5 10 15	
ggg tta ttt gcg ctg gtc aac ccg gta ggg att att ccc gtc ttt atc	96
Gly Leu Phe Ala Leu Val Asn Pro Val Gly Ile Ile Pro Val Phe Ile	
20 25 30	
agc atg acc agt tat cag aca gcg gca gcg cga aac aaa act aac ctt	144
Ser Met Thr Ser Tyr Gln Thr Ala Ala Ala Arg Asn Lys Thr Asn Leu	
35 40 45	
aca gcc aac ctg tct gtg gcc att atc ttg tgg atc tcg ctt ttt ctc	192
Thr Ala Asn Leu Ser Val Ala Ile Ile Leu Trp Ile Ser Leu Phe Leu	
50 55 60	
ggc gac acg att cta caa ctt ttt ggt ata tca att gat tcg ttc cgt	240
Gly Asp Thr Ile Leu Gln Leu Phe Gly Ile Ser Ile Asp Ser Phe Arg	
65 70 75 80	
atc gcc ggg ggt atc ctg gtg gtg aca ata gcg atg tcg atg atc agc	288
Ile Ala Gly Gly Ile Leu Val Val Thr Ile Ala Met Ser Met Ile Ser	
85 90 95	
ggc aag ctt ggc gag gat aaa cag aac aag caa gaa aaa tca gaa acc	336
Gly Lys Leu Gly Glu Asp Lys Gln Asn Lys Gln Glu Lys Ser Glu Thr	
100 105 110	
gcg gta cgt gaa agc att ggt gtg gtg cca ctg gcg ttg ccg ttg atg	384
Ala Val Arg Glu Ser Ile Gly Val Val Pro Leu Ala Leu Pro Leu Met	
115 120 125	
gcg ggg cca ggg gcg atc agt tct acc atc gtc tgg ggt acg cgt tat	432
Ala Gly Pro Gly Ala Ile Ser Ser Thr Ile Val Trp Gly Thr Arg Tyr	
130 135 140	
cac agc att agc tat ctg ttt ggt ttc ttt gtg gct att gca ttg ttc	480
His Ser Ile Ser Tyr Leu Phe Gly Phe Phe Val Ala Ile Ala Leu Phe	
145 150 155 160	
gct tta tgt tgt tgg gga ttg ttc cgc atg gca ccg tgg ctg gta cgg	528
Ala Leu Cys Cys Trp Gly Leu Phe Arg Met Ala Pro Trp Leu Val Arg	
165 170 175	
gtt tta cgc cag acc ggc atc aac gtg att acg cgt att atg ggg cta	576
Val Leu Arg Gln Thr Gly Ile Asn Val Ile Thr Arg Ile Met Gly Leu	
180 185 190	

ttg	ctg	atg	gca	ttg	ggg	att	gaa	ttt	atc	gtt	act	ggt	att	aag	ggg	624
Leu	Leu	Met	Ala	Leu	Gly	Ile	Glu	Phe	Ile	Val	Thr	Gly	Ile	Lys	Gly	
		195					200					205				

att	ttc	ccc	ggc	ctg	ctt	aat	taa									648
Ile	Phe	Pro	Gly	Leu	Leu	Asn										
		210				215										

<210> 12

<211> 215

<212> PRT

<213> Escherichia coli

<400> 12

Val	Ile	Gln	Thr	Phe	Phe	Asp	Phe	Pro	Val	Tyr	Phe	Lys	Phe	Phe	Ile	
1				5					10					15		

Gly	Leu	Phe	Ala	Leu	Val	Asn	Pro	Val	Gly	Ile	Ile	Pro	Val	Phe	Ile	
			20					25					30			

Ser	Met	Thr	Ser	Tyr	Gln	Thr	Ala	Ala	Ala	Arg	Asn	Lys	Thr	Asn	Leu	
		35					40					45				

Thr	Ala	Asn	Leu	Ser	Val	Ala	Ile	Ile	Leu	Trp	Ile	Ser	Leu	Phe	Leu	
	50					55					60					

Gly	Asp	Thr	Ile	Leu	Gln	Leu	Phe	Gly	Ile	Ser	Ile	Asp	Ser	Phe	Arg	
65					70					75					80	

Ile	Ala	Gly	Gly	Ile	Leu	Val	Val	Thr	Ile	Ala	Met	Ser	Met	Ile	Ser	
				85					90					95		

Gly	Lys	Leu	Gly	Glu	Asp	Lys	Gln	Asn	Lys	Gln	Glu	Lys	Ser	Glu	Thr	
			100					105					110			

Ala Val Arg Glu Ser Ile Gly Val Val Pro Leu Ala Leu Pro Leu Met  
115 120 125

Ala Gly Pro Gly Ala Ile Ser Ser Thr Ile Val Trp Gly Thr Arg Tyr  
130 135 140

His Ser Ile Ser Tyr Leu Phe Gly Phe Phe Val Ala Ile Ala Leu Phe  
145 150 155 160

Ala Leu Cys Cys Trp Gly Leu Phe Arg Met Ala Pro Trp Leu Val Arg  
165 170 175

Val Leu Arg Gln Thr Gly Ile Asn Val Ile Thr Arg Ile Met Gly Leu  
180 185 190

Leu Leu Met Ala Leu Gly Ile Glu Phe Ile Val Thr Gly Ile Lys Gly  
195 200 205

Ile Phe Pro Gly Leu Leu Asn  
210 215

<210> 13

<211> 28

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<213> Artificial Sequence

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<210> 14

<211> 29

<212> DNA

<213> Artificial Sequence

<220>

<223> Synthetic DNA

<400> 14

ccagatctgg tagttgtgac gctaccggg

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<210> 15

<211> 594

<212> DNA

<213> Escherichia coli

<220>

<221> CDS

<222> (1)..(591)

<223>

<400> 15

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1 5 10 15

48

ccg ctc gga aac cta cct att ttc atg tcc gta ctg aaa cat act gaa  
Pro Leu Gly Asn Leu Pro Ile Phe Met Ser Val Leu Lys His Thr Glu  
20 25 30

96

ccg aaa aga cgg cgg gca atc atg gtg cga gag ttg ctt att gct ctc  
Pro Lys Arg Arg Arg Ala Ile Met Val Arg Glu Leu Leu Ile Ala Leu  
35 40 45

144

ctg gtg atg ctg gtg ttc ctg ttt gcg ggt gag aaa att ctg gca ttt  
Leu Val Met Leu Val Phe Leu Phe Ala Gly Glu Lys Ile Leu Ala Phe

192

50	55	60	
ctt agc cta cga gca gaa acc gtc tcc att tct ggc ggc atc att ctg			240
Leu Ser Leu Arg Ala Glu Thr Val Ser Ile Ser Gly Gly Ile Ile Leu			
65	70	75	80
ttt ctg atc gcc att aaa atg att ttc ccc agc gct tca gga aat agc			288
Phe Leu Ile Ala Ile Lys Met Ile Phe Pro Ser Ala Ser Gly Asn Ser			
	85	90	95
agc ggg ctt ccg gca ggt gaa gag cca ttt atc gtg ccg ttg gca att			336
Ser Gly Leu Pro Ala Gly Glu Glu Pro Phe Ile Val Pro Leu Ala Ile			
	100	105	110
ccg tta gtc gcc ggg ccg act att ctc gcc acg ctg atg ttg ttg tct			384
Pro Leu Val Ala Gly Pro Thr Ile Leu Ala Thr Leu Met Leu Leu Ser			
	115	120	125
cat cag tac ccg aat cag atg ggg cat ctg gtg att gct ctg ctg ctg			432
His Gln Tyr Pro Asn Gln Met Gly His Leu Val Ile Ala Leu Leu Leu			
	130	135	140
gcc tgg ggc ggc acc ttt gtc atc ctg cta cag tct tcg cta ttt tta			480
Ala Trp Gly Gly Thr Phe Val Ile Leu Leu Gln Ser Ser Leu Phe Leu			
145	150	155	160
cgt ctg ctg ggc gag aaa ggg gtg aac gca ctt gaa cgc ctg atg gga			528
Arg Leu Leu Gly Glu Lys Gly Val Asn Ala Leu Glu Arg Leu Met Gly			
	165	170	175
ttg att ctg gtg atg atg gca acc cag atg ttc ctc gac ggc att cga			576
Leu Ile Leu Val Met Met Ala Thr Gln Met Phe Leu Asp Gly Ile Arg			
	180	185	190
atg tgg atg aag ggg taa			594
Met Trp Met Lys Gly			
	195		

<210> 16

<211> 197

<212> PRT

<213> Escherichia coli

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Met Asn Glu Ile Ile Ser Ala Ala Val Leu Leu Ile Leu Ile Met Asp  
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Pro Leu Gly Asn Leu Pro Ile Phe Met Ser Val Leu Lys His Thr Glu  
20 25 30

Pro Lys Arg Arg Arg Ala Ile Met Val Arg Glu Leu Leu Ile Ala Leu  
35 40 45

Leu Val Met Leu Val Phe Leu Phe Ala Gly Glu Lys Ile Leu Ala Phe  
50 55 60

Leu Ser Leu Arg Ala Glu Thr Val Ser Ile Ser Gly Gly Ile Ile Leu  
65 70 75 80

Phe Leu Ile Ala Ile Lys Met Ile Phe Pro Ser Ala Ser Gly Asn Ser  
85 90 95

Ser Gly Leu Pro Ala Gly Glu Glu Pro Phe Ile Val Pro Leu Ala Ile  
100 105 110

Pro Leu Val Ala Gly Pro Thr Ile Leu Ala Thr Leu Met Leu Leu Ser  
115 120 125

His Gln Tyr Pro Asn Gln Met Gly His Leu Val Ile Ala Leu Leu Leu  
130 135 140

Ala Trp Gly Gly Thr Phe Val Ile Leu Leu Gln Ser Ser Leu Phe Leu  
145 150 155 160

Arg Leu Leu Gly Glu Lys Gly Val Asn Ala Leu Glu Arg Leu Met Gly  
165 170 175

Leu Ile Leu Val Met Met Ala Thr Gln Met Phe Leu Asp Gly Ile Arg  
180 185 190

Met Trp Met Lys Gly  
195